National Aeronautics and Space Administration

Office of Space Science

SPACE SCIENCE ADVISORY COMMITTEE

March 20-22, 2001
NASA Headquarters
Washington, DC

MEETING REPORT

Marc S. Allen
Executive Secretary

Steven W. Squyres
Chair

SPACE SCIENCE ADVISORY COMMITTEE (SScAC)
NASA Headquarters
March 20-22, 2001

Meeting Minutes
Table of Contents

Meeting Report Prepared By:
Paula Burnett Frankel, Consultant
RS Information Systems, Inc.

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Tuesday, March 20

Welcome and Chair's Remarks

Dr. Steven Squyres, Chair of the SScAC, called the meeting to order and welcomed members and attendees. After reviewing the agenda, he briefed the Committee on the NASA Advisory Council (NAC) meeting that was held on March 15-16, 2001. One of the primary topics of the meeting was the Government Performance and Results Act (GPRA). At its November 2000 meeting, the SScAC had been presented with 19 science objectives against which it evaluated the performance of the Office of Space Science (OSS); this was presented to the NAC at its December 2000 meeting. The NAC was very pleased and impressed with the Space Science performance, and changed some of the "greens" to "blues." The final score approved by the NAC at the December 2000 meeting was three blues, one red, one yellow, and the rest green. However, when this went through the entire Agency process and was summarized and presented to the NAC at its March 2001 meeting, OSS was shown as the most poorly performing Enterprise with 48% of its targets scored yellow or red. The Agency explanation was that there were other technical milestones in addition to the 19 science objectives for a total of 65 targets. The 19 science scores were collapsed to two targets; therefore, the entire science accomplishment was collapsed to two grades. The other 63 flight mission milestones (many of which were minor or trivial) were graded literally by Code B and resulted in yellows and reds. This created the distorted impression that FY 2000 was a very bad year and that OSS was a poorly performing organization. The NAC was very alarmed and displeased over this distorted view. The NAC recommended that since GPRA requires an external evaluation, the NAC scores should be the prominent assessment in the Report and NASA's assessment should be in the Appendix. A consequence of this is that an accurate picture of OSS performance will be portrayed in the final Report. Dr. Squyres observed that it is important that the questions be properly posed in the beginning, and that now is the time to pose the questions for FY 2002. A set of standards needs to be developed that will produce an outcome that is meaningful. Tying every target to a specific budget line is not a requirement. Dr. Squyres noted that the SScAC would have an opportunity to review the FY 2002 proposed goals and indicators at this meeting.

Science Theme Director Reports

Dr. George Withbroe reported on Sun-Earth Connection (SEC). All of the 14 operating missions are working very well. The Advanced Composition Explorer (ACE) has a minor problem on one of the experiments that is well covered by the others. In January, there were four cover stories. Most of the missions under development are proceeding nominally. There are a few problems. The Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) mission has slipped to August 10, 2001, due to problems with manifesting the Jason mission. Solar B is moving into Phase C/D and is scheduled for launch in August 2005. The Solar Terrestrial Relations Observatory (STEREO) was threatened with cost growth and the program is implementing $4 M of descopes to limit cost growth. On Solar Probe, a study by JPL found that a non-nuclear mission is technically feasible; however, mission funding was terminated in the President's Budget Blueprint. It now goes back to the study phase. Dr. Withbroe could not discuss the details of the budget since it has not yet been released to Congress. All of the other missions are green (normal progress). Dr. Withbroe showed some videos of the solar maximum that were shown at a Space Science Update press conference on December 21, 2000.

Dr. Alan Bunner reported on Structure and Evolution of the Universe (SEU). He discussed the budget, the fate of Cosmic Journeys, and some other issues. The operating missions are going very well, and everything is working fine. Most of the missions in development are progressing normally. The only mission that is red is a non-OSS mission—the Cooperative Astrophysics and Technology Satellite (CATSAT), which is a student satellite project. When Goddard Space Flight Center (GSFC) reviewed the status of the mission, it became clear that the mission was only at Preliminary Design Review (PDR) level. If there is a means to correct it through NASA assistance (at less than $1M), SEU will do so; if not, the recommendation is to let it launch as is. Dr. Drake observed that this is a classic problem with student run

missions—if there is no professional project management in place, a student run mission will move more slowly and different "success" criteria should be used. There are some issues (mass and cost) with the Gamma ray Large Area Space Telescope (GLAST) that GSFC is working to resolve. Planck is yellow because of a detail in the letter agreement relating to cross-waiver of liability. This issue has brought the project to a halt. It is receiving attention at the highest levels at the European Space Agency (ESA) and at NASA. Gravity Probe (GP)-B is going well technically; however, the project office has come in with a request for additional funds (current reserves will be depleted by launch). Dr. Bunner highlighted some aspects of the budget. The Cosmic Journeys budget did not make it into the FY 2002 budget. The transition team made it clear that there would be no new initiatives this year. Cosmic Journeys is on hold for another year, but the program is well poised for FY 2003. Funds for the Advanced Cosmic-ray Composition Experiment on the Space Station (ACCESS) were needed in FY 2002; it will be held up for a year. The future of Space Station is uncertain and the budget details on that program are not available yet. The Laser Interferometer Space Antenna (LISA), a joint program with ESA, is going well. Dr. Bunner discussed a recent management change on the program—the lead management on LISA was brought to GSFC. The scientific payload will be managed by the Jet Propulsion Laboratory (JPL). This management change appears to be succeeding. Both GSFC and JPL have put their best people on the project. In response to a question regarding the view of the science community, Dr. Margon noted that the SEU discussion on this topic did not result in a proposed action item for the SScAC. Dr. Squyres added that the SScAC will continue to focus attention on this program. Dr. Bunner noted the upcoming scheduled SEU launches—the Microwave Anisotropy Probe (MAP), CATSAT (this may slip), and the Galaxy Evolution Explorer (GALEX). Based upon the Senior Review of operating missions, the Extreme Ultraviolet Explorer (EUVE) operations have ended.

Dr. Anne Kinney reported on Astronomical Search for Origins (ASO). There are some real challenges in Origins. Except for Terrestrial Planet Finder (TPF), all of the major missions are red, and most of these have budget issues for which there are no solutions within the theme. There are a number of financial problems on Hubble Space Telescope (HST); the Space Operations Management Office (SOMO) funding shortfall is now $69 M. However, the launch date is still holding for November 2001. The Next Generation Space Telescope (NGST) has been through a rescope (discussed in detail later in the meeting), but the guideline is still short by $80 M. There is a cryostat problem on the Space Infrared Telescope Facility (SIRTF); there is a budget shortfall of $42 M in FY 2002. A replan is in work. The Stratospheric Observatory for Infrared Astronomy (SOFIA) has experienced substantial cost growth; there has been a change in management at Ames Research Center (ARC) and the Center is working on a solution within its budget. The likely result will be a two-year delay in operations. Starlight has undergone a cost increase and is under review; requirements and rescope options are being examined. The Space Interferometry Mission (SIM) project identified a major cost growth last year. The SIM team is working on developing mission concepts for a new $930 M cap. Cost assessment is being done at the same time as the rescope. The Keck Interferometer had first light on March 14. This was a real accomplishment. Dr. Kinney discussed the issues and plans in each of the flight missions in greater detail. Dr. Squyres observed that all of the nearer term flight missions are red for cost reasons; this could indicate that Origins has too much on its plate. He noted that the red situation in Origins is a serious issue that needs to be addressed by SScAC. In response to a question, Dr. Kinney noted that SIM is on the critical path to TPF scientifically, but not technologically. She briefly described the Phase 2 TPF architecture study concepts. The NASA Research Announcement (NRA) for Keck-Keck science will be released this spring for observations to start in the fall. The outriggers for astrometry and imaging have been delayed by permitting issues.

<u>Mars Exploration Program</u>

Dr. Scott Hubbard provided a status update on the Mars Exploration Program. He noted that *Aviation Week* had a special issue on Mars in December. The Budget Blueprint included funding for a "robust Mars Program;" however, details are embargoed until April. The Mars Global Surveyor (MGS) extended mission is underway. Mars Odyssey is on schedule for launch with a 4 day margin. All red team issues have been resolved. Mars Exploration Rover (MER) has been approved to proceed to development. Mass margins have improved significantly. Schedule is the project's major risk. JPL and its contractors have put their "A" teams on the project. Dr. Squyres seconded Dr. Hubbard's comment about the quality of the team; it is the best he has ever seen. The Science Definition Team (SDT) activities for Mars Reconnaissance Orbiter (MRO) have been completed and the payload Announcements of Opportunity

(AO's) and spacecraft Request for Proposal (RPF) should be released in March. The international cooperation discussions are moving forward. NASA will not sign up to an international collaboration program where the risk of the partner is too high. Dr. Garvin went through the recommendations of the SScAC and reported on each one. The charter/terms of reference for the Mars Task Force was approved in January and members (about 12) have been selected from the broad community. Formal invitations will be issued following final approval by NASA. One possible near term task is reviewing the Mars Program Technology Plan. NASA has re-chartered the Mars Exploration Payload Analysis Group (MEPAG) to evolve to become the Science Working Group (SWG). In addition, there will be a Sub-surface SWG (which includes both scientists and engineers) to look at sub-surface methods. In response to a question regarding why there needed to be another group separate from MEPAG, Dr. Garvin stated that MEPAG did not have all of the expertise to look at the sub-surface. The results of the Sub-surface SWG will go back through MEPAG. Dr. Squyres indicated that any additional work by sub-groups should pass through MEPAG. He thought that the preferred approach should be to add additional members (with the necessary expertise) to MEPAG. In response to SScAC's recommendation, NASA formed the SDT for the 2005 MRO mission in late November 2000. The recommended MRO science focus is Mars Climate Orbiter (MCO) climatology recovery and high resolution targeted reconnaissance. An AO is in process for competing prime instruments and facility teams. The SDT for the 2007 mission opportunity is currently under development. With respect to the SScAC recommendation on Mars sample return, Dr. Garvin noted that systematic validation of new technologies is required to ensure success of Mars Sample Return (MSR). Eight new technologies are being developed in the Focused Technology Program for use in MSR. Some of these technologies require flight validation at Mars before use in MSR; these will be validated on the Mars 2007 flight opportunity for use in MSR 2011. Dr. Squyres noted that in order for MSR to happen, there must be robust funding for the Mars Program. Based on the 2001 budget runout with adjustments for inflation, early retirement of risk, and technology validation, the earliest sample return mission should be 2014. Dr. Papike took issue with this strategy. Dr. Squyres indicated that the SScAC would return to a discussion of the Mars sample return strategy later in the meeting. Dr. Hubbard noted that the program has established Mars Scout missions; they will be capped at about $300 M. As an initial step, he proposed that 6 to 10 promising mission concepts be selected for funding. Dr. Hubbard showed the proposed two-step Mars Scout schedule. There are windows to accommodate two possible trajectories (north polar and south polar), one with launch in December 2006, and one with launch in September 2007. Dr. Squyres questioned whether the budget and schedule allotted are adequate for technology development and retirement of risk.

Proposed Education/Public Outreach (EPO) Task Force

Dr. Rosendhal discussed a proposal to establish an SScAC EPO Task Force. He showed some examples of significant education products that have been developed under the OSS EPO partnerships and briefly reviewed the chronology of OSS education and outreach. It is now time to have an external "sanity check" on what has been done and whether any significant changes are needed. This is not a new idea; the thought of an advisory subcommittee to provide guidance and oversight had been built into the original 1996 implementation plan. Dr. Squyres noted that the SScAC has been continually impressed and pleased with the progress of the EPO program. The SScAC agreed that the EPO program has reached a state of maturity where it is appropriate for external review. The question is: How can an external review process be formed to best serve the EPO effort? An SScAC Task Force is subject to all of the restrictions that go with the Federal Advisory Committee Act (FACA). There are other ways an external review could be done. Ms. Carrie Sorrels indicated that there could be an external group to provide a review and report to SScAC without establishing the group under FACA. Dr. Margon observed that the Astronomy Decadal Survey has been of great benefit to OSS programs, and he suggested that Dr. Squyres talk with Dr. McKee directly regarding the intent of the Decadal Survey recommendation for an external review of the OSS Educational Ecosystem program. The SScAC agreed that it would provide a recommendation to OSS as to how to best achieve the objective. Dr. Squyres tabled further discussion until later in the meeting.

OSS Status Report

Dr. Weiler reported on the status of OSS. The Agency budget is set at $14.5 B (2% increase over FY 2001). Final details of the budget are still under review and will be released with the full budget on April 9, 2001. Hearings have been scheduled for May 3, 2001. Dr. Weiler could not provide further details at this time, although he noted the major features of the Space Science budget that were in the Budget Blueprint:

it funds a more robust Mars Exploration Program; it funds key technology investments (e.g., in-space propulsion) to enable a potential future sprint to Pluto before 2020; and it provides critical technology funding to support future decisions on high-energy astrophysics missions. Funding for two missions was deleted—Pluto-Kuiper Express and Solar Probe. In response to a question, Dr. Weiler noted that the Department of Energy (DOE) is very interested in working with OSS on the propulsion/power issues. The Blueprint also called for a study to assess the pros and cons of moving the National Science Foundation's (NSF's) ground-based astronomy program to NASA/OSS. The results of the study will be input to the FY 2003 budget. Dr. Squyres noted that the SScAC had no comment at this time.

Some current "high-profile happenings" include the Near Earth Asteroid Rendezvous (NEAR) landing at Eros and the imminent launch of Mars Odyssey on April 7. Although Pluto funding was deleted from the budget, Congress has directed NASA to continue with the AO (using funds in the current fiscal year budget). OSS had a number of front-page news stories and magazine cover stories over the past year. *Science News* compiles the "top stories" each year, and NASA programs have accounted for almost 6% of the "most important" science stories during this time period. OSS was responsible for more than 4%. OSS had 20 of the 25 most productive single programs. NASA accounted for over 8% of worldwide discoveries in 2000, and space science accounted for 4.4%. The Education Annual Report summarizes nearly 400 OSS products and accomplishments. OSS has EPO venues in all 50 states.

Dr. Weiler discussed the streamlined OSS organization. Basically, a layer of management was eliminated. Lines of authority are clear. The Executive Director for Science and the Executive Director for Programs (staff positions to the Associate Administrator) were added to retain all of the positive aspects of the previous theme-oriented organization. The major move was to re-create the "old" organization with three science divisions: Sun-Earth Connection, Solar System Exploration, and Astronomy and Physics. Other Division level organizations include: Mars Exploration Program Office, JPL/NASA Management Office, Resources Management Division, and Policy and Business Management Division. The science themes will be retained to focus science and do strategic planning. Astrobiology will be in the Solar System Exploration Division. Dr. Weiler asked for SScAC advice on what to do with the FACA subcommittee structure. There will be three Research and Analysis (R&A) budgets; however, the uniformity of peer review and how peer reviews are done will be the responsibility of the Executive Director for Science. In response to a question, Dr. Riegler noted that the only cluster that spanned Divisions was the cross-cluster Theory Program; that will be split up. The Mars Exploration Program Office will not include Mars scientists or the Mars science budget. The science money will be in the Solar System Exploration Division; the Program Scientist reports directly to the Associate Administrator and advises the Mars Program Director. In response to a question, Dr. Weiler noted that the Mars Program Management is at NASA Headquarters; in-space propulsion management (the former Outer Planets Program) will also be at NASA Headquarters. Dr. Dressler questioned whether the SScAC could provide some input on where Astrobiology could fit better in the long term. The near-term versus long term is the issue. Dr. Drake stated that one of the aspects of the current organization that should be maintained is the collegiality and overlap among themes. Dr. Weiler added that OSS is in a much better position now to make the streamlined organization work in a collegial manner than it was 10 years ago. Each of the "line" divisions (SEC, SSE, Astronomy and Physics) will have Directors who are scientists and Associate Directors who are recognized managers/engineers.

Dr. Weiler reviewed the responses to the SScAC recommendations. With respect to Outer Planets, the intent is to show Congress and OMB that there are a lot of ideas beyond the Pluto mission. Dr. Colleen Hartman will be in charge of the in-space propulsion program. Due to the budget information embargo, Dr. Weiler could not provide further details at this time. The Astrobiology Task Force topic will be addressed at the next meeting. In response to a comment, Dr. Weiler noted that SOMO is a multi-dimensional problem. There have been some savings and OSS has benefited from those savings. His goal is to gain control of how the operations are done. Dr. Squyres raised the issue of the "red" programs in Origins. Dr. Weiler noted that HST is now yellow, if not green. NGST should be yellow after the next month. The SIM project is working on a rescope aimed at getting it within the cost target; if successful, it will be yellow. If not, there may be ideas to do SIM science more cheaply, and an AO to solicit those ideas is possible. Dr. Squyres asked if it would be useful for SScAC to examine science priorities within the Origins theme and present some findings/recommendations. NGST and SIRTF are clearly the highest priorities. TPF is the

cornerstone of the Origins Program. The relative priorities of SIM, StarLight, and SOFIA are the ones that SScAC could look at. The question is: Has technology progressed to the point where NASA could solicit SIM science ideas?

Lunch Talk on the NEAR Mission

Dr. Andrew Cheng gave a lunch talk on the NEAR mission and science. The first asteroid fly-by was Mathilde in June 1997; the second asteroid fly-by was Eros in December 1998. The data acquired in the Eros fly-by helped the encounter two years later. Dr. Cheng showed several close-up images of impact craters, boulders, and ridges. NEAR discovered that Eros is a consolidated (a coherent rock) body, not a rubble pile; its composition is primitive and undifferentiated. Eros' density is comparable to Earth's crust and similar to other S asteroids, but less than that of likely meteorite analogs. Its density is uniform to within a few percent. There is a marked deficiency of craters <100 m diameter compared with the Moon; there are more boulders than small craters. Dr. Cheng showed some of the unusual surface features, e.g., flat "ponded" regions, rounded boulders, and unusual ridges. He noted that there is no funding for data analysis (DA) for NEAR after July 2001. Dr. Squyres deferred this programmatic discussion until later in the meeting.

Science Theme Director Reports (continued)

Dr. Jay Bergstralh reported on Solar System Exploration (SSE). Most of the missions are in "yellow" status—Stardust (navigation camera problems); Cassini; Mars Odyssey (little schedule margin); Rosetta (scarce funds to complete the JPL instrument); Europa Orbiter (replanning is in process); Advanced Radioactive Propulsion System (ARPS) (development/cost risk); Genesis (delay costs exceed Discovery budget); and Deep Impact (descoping to recover cost reserves). The launch window for Genesis opens on July 30, 2001. Mars Odyssey is scheduled for launch on April 7. The U.S. has an experiment on ESA's Mars Express. MESSENGER is still proceeding nominally. The first phase selections for the current Discovery competition were made: Kepler (an extra-solar planet search by occultation method); INSIDE Jupiter (study of interior structure of Jupiter); Dawn (an orbital mission to Vesta and Ceres); and Netlander (a Mission of Opportunity). Concept studies for the three Discovery "full-up" missions begin March 22, 2001. Downselect to one is planned for September 2001. In response to a question, Dr. Dressler indicated that Kepler is not a pathfinder for TPF because the stars are too far away to find targets for TPF.

Outer Planets

Dr. Bergstralh gave Dr. Hartman's presentation on the status of the Outer Planets Program. Serious technical and programmatic problems (increased total mission mass, launch vehicle uncertainty, and delays in the schedule and increases in the cost of the radioactive power source) surfaced last year and came to a head in the September 2000 time frame. As a result, the budget profile for FY 2000 – FY 2006 far exceeded the maximum available budget. This led to the cancellation of the Pluto-Kuiper Express mission. Dr. Hartman was charged with developing a replan for Europa Orbiter (EO) and a Pluto mission. JPL presented a draft version of the proposed plan to NASA Headquarters in November 2000. By December, Dr. Weiler decided to release the Pluto AO, rebaseline Europa for a launch in 2008, and create an Outer Planets Program Directorate at NASA Headquarters. The decision to release the Pluto AO was a direct result of a recommendation from the Solar System Exploration Subcommittee (SSES); the other two actions were recommendations of the Executive Committee. The Pluto AO was released on January 19, 2001; proposals are due April 6, 2001. There is no required launch date, but the mission must arrive at Pluto by 2020. This will be a two-step selection with the first step in the June time frame (two proposals) and final downselect at the end of the summer. As noted earlier, Congress directed NASA to go forward with the AO although funding for Pluto was deleted in the FY 2002 Budget Blueprint. The EO launch was baselined for 2008 with two RTG's. The Independent Assessment was initiated on March 4; an interim report is due May 15 with a final report on July 20. The EO baseline uses up the available Plutonium 238, although there are indications that DOE may reopen Plutonium 238 production. However, if Pluto is approved by Congress to go forward and launches first, it would use the available RTG's. A possible solution exists for getting to both Pluto and EO, but it depends on DOE getting plutonium production going or successfully developing an ARPS. Dr. Squyres stated and Dr. Bergstralh agreed that selection of a Pluto mission would put the 2008 EO mission at some risk. Dr. Drake added that the Program expects to have a lower risk ARPS by 2006. There is an ongoing study on the RPS issue; a report will be presented to NASA and DOE on April 3. One of the features of the new Outer Planets Program was a workshop/forum on

innovative approaches to outer planets exploration. There will be a report on both science and technology approaches. Dr. Hartman has instituted a zero-base review of all technologies in the Program. Each activity will be reviewed to determine its usefulness to the Program. The Budget Blueprint includes additional funds to develop key propulsion technology investments.

Subcommittee Reports

Dr. Michael Drake reported on the SSES meeting earlier in March. There were several recommendations. The SSES endorsed raising the cost cap on Discovery missions to at least keep place with inflation. With respect to R&A, the SSES strongly urged the hiring of more civil servants and Intergovernmental Personnel Act (IPA) staff at NASA Headquarters. Dr. Riegler is moving to address this issue. The Subcommittee recommended restoring balance to the study of Near-Earth Objects (NEO's). The SSES strongly recommended that studies of outer solar system advanced mission concepts should be tightly coupled to the immediate SSE goals. Any solution to the Huygens telemetry problem should maximize overall mission science return, even if it delays deployment of the Huygens probe. The SSES recommended that SSE find some way of balancing funding between mission operations and data analysis. The SSES had three recommendations with respect to extended missions: fund a final extended Galileo mission that will return Io data, ending with inevitable Jupiter impact; develop a plan to fund extended missions for Cassini; and plan in advance for Mission Operations and Data Analysis (MO&DA) funds for extended missions for all future missions. Dr. Squyres noted that in astrophysics, the issue of what missions are funded for extended operations is addressed by the Senior Review. The planetary program flight rate has increased markedly and is moving into a realm where a number of missions will be competing for scarce resources. SSE should find a way to deal with extended missions in a coherent fashion the way that other themes have done. Dr. Bergstralh indicated that he would like to conduct periodic Senior Reviews, but there is not a pool of MO&DA funds for extended mission operations for Galileo and Cassini. It should be budgeted into missions in the future. Two SSES subcommittees were tasked to work on the next SSE Roadmap: Exploring Organic Rich Environments (the outer solar system) and Evolution of a Habitable Planet (the inner planets).

Dr. Margon reported on the Structure and Evolution of the Universe Subcommittee (SEUS) meeting earlier in the month. He initially discussed some science results from the Chandra Observatory (the Chandra Deep Field North—a superset of the Hubble Deep Field North). The SEUS discussed several topics: the budget, the OSS reorganization, and Cosmic Journeys. Cosmic Journeys was not funded in FY 2002; however, there was explicit language in the Budget Blueprint for specially designated funds for technology development for high-energy astrophysics. The Laser Interferometer Space Antenna (LISA) and Constellation X are desperately starved for technology development funds, and the budget brings good news. With respect to the reorganization, the SEUS felt that a single advisory subcommittee of reasonable size for astrophysics cannot handle the diversity of astrophysics disciplines, which has increased enormously in recent years. A series of standing subgroups would break parallelism with the other subcommittees. Dr. Squyres noted that there would be a discussion of this topic later in the meeting. The SEUS was concerned with International Space Station (ISS) issues. Descoping of ISS may reduce opportunities for OSS science. ACCESS and the Energetic X-ray Imaging Survey Telescope (EXIST) both require ISS; both were ranked highly in the OSS Strategic Plan and the National Academy of Sciences (NAS) Decadal Survey. Efforts to enable these unique programs must continue. Dr. Squyres noted that this is the kind of issue that can be taken to the NAC—significant OSS science could be damaged by descoping ISS. Dr. Bunner agreed that this should be brought to the attention of the NAC, and the sooner the better. The only place that can accommodate ACCESS is on the long truss. Dr. Squyres indicated that he would be willing to take this issue to the NAC, but that he would like to get more up-to-date information on the status of ISS and the truss before the next NAC meeting. GLAST is the highest priority large SEU mission in development. There are new budget pressures, some specific to the program, but a substantial one caused by recent Agency-wide policy issues, e.g., a need for deorbit propulsion, requiring a larger launcher, as well as other quality control concerns. There are also new GP-B budget problems. The SEUS reiterated that its scientific priorities clearly favor GLAST.

Dr. Alan Dressler reported on the Origins Subcommittee (OS) meeting held at Pasadena earlier in the month. The OS received a detailed progress report on SIRTF and a review of the 7 Legacy programs that will use SIRTF in the first few years. The OS also heard from the new Program Manager for SOFIA, who

described some of the difficulties the program has faced and his attempt to put things back on track. Although optimism was expressed, the OS remained concerned that the Program can be brought to a successful conclusion with the available resources. The OS supported Dr. Kinney's decision to attempt to accommodate the cost overruns within the SOFIA budget. The OS also received a briefing on SIM. The project has been challenged to consider alternate designs that satisfy three requirements—fit within a cost cap of $930 M, have terrestrial planet detection as a key mission goal, and identify targets for TPF. The Project advocated the "Shared Baseline SIM," which maintains most of the original science and should fit within the cost envelope. The OS was impressed by this design, which eliminates the difficult 12-m metrology boom and could be launched with the Shuttle. The OS recommended that the SIM team be given approximately two years to develop the required component technology and integrate it into a systems-level testbed that validates SIM's error budget and performance at the level necessary to detect terrestrial planets. These demonstrations should be prerequisites to initiating the Non-Advocate Review (NAR) and entering into implementation phase. If at that time (early in Phase B), they are not able to demonstrate such performance, then a significant restructuring of the program or cancellation should be considered. Dr. Beichman added that the big issue on SIM is whether the science program can be accomplished within the cost cap and the required technology can be demonstrated. This recommendation puts milestones on that decision process. With respect to NGST, the OS believes that even with all of the proposed changes, NGST will remain the immensely powerful facility given first rank by the Decadal Survey. The OS shared the concern of the Interim Science Working Group (ISWG) about the complexity of proposed instrument collaborations among U.S., Canadian, and European instrument builders. The OS strongly favored the U.S. having responsibility for the IR camera. The OS stressed the importance of mid-IR imaging and spectroscopic capability on NGST. It is needed to continue and extend the science of SIRTF. However, the OS agreed that the mid-IR instrument should not drive the development of NGST. It is premature to consider eliminating the instrument without looking at possible trade-offs. The OS felt that the integrity of the Origins theme and advisory structure should be preserved. The OS discussed the total funding shortfall in the OS program and whether the theme could afford two missions to develop interferometry. It also questioned how the theme could find the resources to develop important technologies. Discovery class missions could develop technology as well as provide important mid-decade science needed to properly design TPF. Dr. Kinney indicated that she has given a lot of thought to a major Origins re-architecture. Currently, she is waiting for the results of the SIM rescope. If the rescope effort looks good, it may not be necessary to do a major re-architecture. An appropriate route would be to convene a workshop, including members of OS, to make some evaluations.

Dr. David McComas reported on the Sun-Earth Connection Advisory Subcommittee (SECAS) meeting held in February. The SECAS recognized the excellent progress on Solar Probe and continued to endorse it in the strongest possible terms. Its cancellation will have dire consequences for some of the highest priority science in the space science program. With respect to Living With a Star (LWS), the SECAS had several recommendations. Science threads and cross-platform impacts should be mapped into each of the notional platforms. The Science Architecture Team (SAT) should identify and prioritize elements for which observations and modeling/theory can make the most progress. In particular, early resolution of this issue is important for allocation of funds. Science and Technology Definition Teams (STDT's) should be organized by platform and composed of interdisciplinary constituents. Low Cost Access to Space (LCAS) is a key component of the SEC theme. The SECAS applauded the decision to place leadership for LCAS in the SEC theme. It recommended a goal of 30 flights per year with a mix of vehicles chosen for the best possible science return. If a university initiative matures with new funds, the SECAS suggested that LCAS should be the centerpiece of that initiative. Another issue that the SECAS discussed was new, unilateral "boilerplate attachment" clauses being inserted into grants and contracts without sufficient forethought as to their potential impact, clarity, or relevance. SECAS recommended a public comment period soliciting input from all affected parties before new boilerplate attachments are inserted into grants and contracts. Dr. Smith recommended that someone check to see if there was a public comment period; he thought that OMB had gone through such a period. He noted that NASA was implementing OMB policy. Dr. Allen recommended that someone from the Chief Information Officer's (CIO's) office come to the SScAC meeting to discuss this with the Committee. Dr. McComas noted that the point was that there should be a public comment period, with input from all affected parties, before new boilerplate is inserted into grants and contracts. Dr. Squyres requested that the SScAC hear from the appropriate person whether or not NASA has a public comment period on changes to boilerplate. Dr. Margon felt that the SScAC should also

question the specific issue under Security Requirements for Unclassified Information Technology Resources (fingerprinting contractors and subcontractors). Dr. Drake observed that the actual implementation of the requirement (monitoring and reporting in addition to fingerprinting) was not in any indirect cost rate and is intrusive and excessive. Dr. Squyres noted that the SScAC would return to the issue of boilerplate later in the meeting. With respect to Solar Terrestrial Probes, the SECAS reiterated that scientific return is the paramount concern. While the SECAS wanted to keep the flight rate as high as possible, it recommended that SEC leadership should have flexibility in applying the cost guidelines to ensure that the unique scientific return of each mission is not compromised. Finally, the SECAS reiterated its very strong endorsement of Space Technology (ST)-5, and urged NASA to maintain the constellation mission-enabling elements of the ST-5 program at the expense of other, more generic technologies or even the ST timeline, if necessary. Dr. McComas summarized the four topics that need engagement from SScAC: support of Solar Probe; LCAS; public comment periods on boilerplate attachments; and maintaining constellation mission-enabling elements of ST-5.

Research Program Status

Dr. Guenter Riegler commented on the findings and recommendations from the last SScAC meeting. On the R&A comparative review, all of the writing panels except astrobiology have formed. With respect to astrobiology, the burden is on Dr. Mike Meyer and he is working on it. Proposals will be due in late April and the review will take place in June. It is not too late to make recommendations for panel candidates. OSS is making good progress. With respect to the clusters and how they map into the new divisions, Dr. Riegler indicated that with the exception of the Theory Cluster, which is already separated into two sub-clusters, there is only one small item that may be moved—the search for other planet systems around nearby stars, which is currently carried in the planetary/origins research program and may go into the astrophysics program. The projections for R&A funding show an increase in future years. Many of the grants decisions in planetary, astrophysics, and astrobiology are late. There have been expressions of interest from people to come to Headquarters to work on the grants process. In addition, OSS is getting more help from the peer review contractor. There will be two additional people assigned at GSFC. Hopefully, all of this will speed up the OSS grants process. There should be a long-term solution to resolve "gaps" in grants coverage. Dr. Riegler noted that there have been problems at Headquarters, GSFC, and also the receiving institutions (e.g., failing to submit progress reports). Dr. Drake noted that the SSES recognized the issues and was pleased with Dr. Riegler's response.

Dr. Squyres highlighted the issues that had surfaced during the day:

- Education Task Force – Having an independent review is a good thing to do. There was not a thorough discussion on whether a FACA Task Force would be the best way to do that. This topic was tabled until the next meeting when Dr. Rosendhal could participate in the discussion
- Mars Program – The SScAC could provide some comments on the competed Scout class of missions.
- Reorganization of the subcommittee structure – Both the OS and SEUS felt that the present thematic structure should be retained; the SScAC needs to discuss this further.
- Boilerplate in grants – Additional information will be provided and discussed further.
- Increases in the caps on certain classes of missions (MIDEX and Discovery) – if there are going to be changes in caps, the SScAC should make recommendations. Additional factual information is needed.
- Impact of ISS descoping on ACCESS – SScAC can carry a message forward to NAC about the impact on an important element of the Space Science Strategic Plan, but further discussion is needed; in addition, the SScAC should reiterate the importance of ACCESS to space science. Additional information on the status of ISS is needed prior to the NAC meeting.
- Outer Planets and Origins – These elements are in a state of stress and are areas of extremely high science priority. Dr. Drake felt that for Outer Planets, it is premature for the SScAC to make a recommendation or take an action at this time. The SSES could bring something to the SScAC at the next meeting. With respect to Origins and the status of replanning activities underway, the SScAC did not feel that it could make a productive recommendation at this time. Dr. Dressler noted that the OS may address something specific at the next meeting.
- Solar Probe – A suggestion was made to hear about the program at the next meeting. A presentation on the science was scheduled for the next day.
- A briefing is needed at the next meeting about radioactive power sources, perhaps from the DOE.

Wednesday March 21

Chairman's Remarks and Discussion

Dr. Squyres returned to an issue raised the previous day—the plutonium issue and the need for DOE to restart production. After discussion with Dr. Weiler, Dr. Squyres noted that the SScAC would not make a recommendation on this topic.

Another issue was the Information Technology (IT) contract boilerplate. There were two separate issues: (1) a general issue on whether there is a policy of a period of public comment before it becomes effective (if not, there should be and the community should be made aware of it); and (2) the specific issue regarding computer security and fingerprinting. Mr. Joe Bredekamp of OSS discussed this topic with the Committee. IT security has become a very "hot" issue, particularly in the last year, and it has been getting a lot of attention at all levels. Maintaining and ensuring data integrity is one aspect and OSS fully endorses and supports this; another aspect is guarding against unauthorized access. The latter has a natural dynamic tension with OSS's open data policy. Within the Agency, security has been the number one priority on the part of the Inspector General (IG). The policy and guidelines are under the purview of the CIO and have been under long-standing internal review and discussion (they are now approved and in place). Within the CIO community and as implemented through the Centers, Mr. Bredekamp noted that he represents the OSS on the CIO activity. The goal is special care and attention with the way that NASA does business with the research community. Initially, universities were excluded from the security policies and directives; within the last year, there has been Federal policy that requires provisions to apply to all contractors. OSS (and the CIO) felt that these did not apply to universities, particularly grants. During the summer, there was a Federal policy that the Agency implemented through the CIO that would apply to contracts. The wording was reviewed within the Agency, and it was to be "worked" through individual Contracting Officers and projects. It was not to be uniformly applied; it was to be negotiated on a case by case basis as applicable. The issue is: Who has the discretion to decide where it applies? Mr. Bredekamp noted that it was supposed to be determined by the projects. This was not done; it was unilaterally and uniformly applied by contracting officers. Mr. Bredekamp indicated that the SScAC should raise the issue—it is important to stay alert to these activities. The NASA CIO is completely aligned with OSS—the policy should not be uniformly applied. The problem appears to be implementation at the field Centers, particularly GSFC. OSS is attempting to fix this by determining on a case by case basis whether the policy should apply. Dr. Margon observed that OSS is already spending funds on this activity that could be spend on research in space science. Dr. Richstone noted that this problem should be raised to Gen. Armstrong. Mr. Bredekamp noted that Gen. Armstrong is aware of this and is working with the CIO.

Dr. Squyres posed the question: Is there a NASA policy to release new provisions for public comment? Things that impact the university community should be vetted in some way. Dr. Smith noted that there was a public comment period by the OMB about 18 months ago. Mr. Bredekamp indicated that the policy should not have been uniformly and unilaterally applied. Dr. Margon noted that the affected parties have tried to negotiate this and that GSFC has said no. The SScAC was very concerned about this issue and agreed to formulate a recommendation to Dr. Weiler that there be a moratorium on the specific IT security contract provisions and a public comment period on future boilerplate.

NGST Reformulation

Dr. Kinney discussed the background of the reformulation. The rescope was driven by several factors. Nexus (the technology demonstration mission) had grown in cost and would have pushed the NGST launch to 2010. The mirror cost reductions and manufacturing time improvements fell short of the original goals, increasing both cost and schedule. The in-house cost studies on the baseline NGST exceeded cost targets and available budget. All of these led to several months' effort on a robust rescope. There have been no major concerns from the ISWG and community. There are some issues about instruments and international contributions: the interfaces must be clear; the community must be involved; the contributions must be clearly defined, but the instrument package should not be two-thirds non-U.S; and the number of instrument operating modes should be kept to a minimum (simple instruments that are simple to operate).

Dr. John Mather discussed the current strategy, rescope process, instruments and science, international partnership concepts, schedules and major procurements, and status of NASA-funded technology development. The rescoped NGST would have a 6-meter class primary mirror. The prime contractor would be selected in 2002 with Critical Design Review (CDR) in 2004 and launch in 2009. Dr. Mather described the NGST concepts and the instrument suite (more or less unchanged since 1996). The rescope process was initiated by the Project Office last summer. The main technical changes were to meet the following objectives: risk reduction without Nexus flight demonstration; launch by 2009 with modest increase in budget; compatibility with more than one launch vehicle; and retention of the core instrument complement and Ad-hoc Science Working Group (ASWG) priorities. The Project has been through briefings with GSFC management, international partners, and NASA Headquarters. More public meetings are planned this spring. Dr. Mather discussed the technical changes that reduced risk (e.g., reduction in mirror size, and changes in areal density, temperature, and testing) and eliminated the need for Nexus. With respect to instrument metrics, the highest ASWG priority was sensitivity over wide fields of view. Dr. Mather showed how the NGST cameras (the original and the rescoped) compare to other observatories (ground, HST, and SIRTF). NGST complements these observatories. The initial international partner concept was to have the internationals split instrument/non-instrument contributions 50/50. NASA is exploring ESA's contribution to a spacecraft bus. The Canadian Space Agency's (CSA's) contribution is more likely to be in the instrument area. The current idea is for NASA to provide shared instrument services, integration, and test, as well as the Near Infrared Camera instrument. ESA would provide the Near Infrared Spectrograph, based on U.S. detectors and multiobject selector. NASA, ESA, and CSA would develop a partnership plan for the mid-IR instrument. CSA is now interested in providing a fine guidance sensor. None of the details have been worked out to completion. Dr. Squyres observed that this concept looked politically driven rather than a minimum risk solution; there would be intricate and complex interfaces. Dr. Mather discussed the top level observatory schedule. The major decision is the NAR in March 2004. Technologies must be at Technology Readiness Level (TRL) 6 by the NAR. The technologies have made progress (about one level in one year). Dr. Mather described some of the great successes to date on the mirrors. Another important technology is the multiobject selector for the spectrograph. Programmatically, the project is still in Phase A; the RFP for the downselect is scheduled for release in June. There have been major awards for instrument technology. The biggest hurdle is the uncertainty on contractor costs. The largest cost growths could occur in the telescope. In addition, there are issues with the International Traffic in Arms Regulation (ITAR).

Report to Associate Administrator

Dr. Squyres briefly reviewed the key issues that had emerged so far in the meeting:

1) *A Task Force of the SScAC to look at education and public outreach issues.* The SScAC is extremely pleased and impressed with the progress. It is a good time to have an external review. The SScAC did not fully discuss whether a formal SScAC task force is the best way to bring about that review. This has been tabled to the next meeting when Dr. Rosendhal can participate in the discussion.
2) *The Mars Program.* Mr. Hubbard requested advice from SScAC how to "jump start" the Mars Scout Program. The question is whether it is best to get some seed money out to the community to bring ideas to a state of maturity, or use the ideas that are available now and have more time for development. Dr. Weiler suggested that some technology money be used for developing less expensive things. Scout has evolved into one mission costing $200+ M. Perhaps more thought should go into what Scouts should be. Dr. Squyres noted that the Scout concept is now a line of missions to fill in the scientific gaps. It is open to any kind of concept; the Scout AO will not specify larger missions. Dr. Weiler noted that the question is whether there should be a bigger mission every 5 years, or smaller, more diverse missions more frequently. Has this gotten broad enough discussion? There appears to be an assumption that Scouts will be big things. The Astrobiology Instrumentation NRA will lead to instrumentation for smaller systems. The SScAC should provide guidance on this issue. Dr. Weiler indicated that he would appreciate a comment on whether the Mars Program should be "taxed" at a small percentage for a Mars-specific R&A program.
3) *Subcommittee reorganization.* The SScAC heard from both the OS and the SEUS; both subcommittees felt that combining the two subcommittees was a bad idea and that they should remain separate. Dr. Squyres noted that the SScAC would discuss this further. Dr. Weiler noted that there could be short, mid, and long-term solutions that the SScAC could comment upon. His only concern

with two separate subcommittees was that they could offer conflicting advice to the Astronomy and Physics Division Director. If there are two subcommittees, they should have close connection.

4) *Origins.* The SScAC recognized that there is a crisis brewing in this theme. The SScAC felt that because this issue falls within the purview of the OS, it is appropriate to have the OS's advice. The OS has made input to Dr. Kinney and she is acting on that advice. At present, the SScAC is delegating any action or advice to the OS. In response to a question, Dr. Weiler indicated that some sharp thinking on SIM is needed as soon as possible. What sold SIM to OMB and Congress was that it was a technological stepping stone to TPF and that it would find Earth-type planets. Over the past five years, the budget increased by a factor of 4, the launch slipped from 2003 to 2009, and SIM may not be a direct technological stepping stone to TPF (TPF may be done other ways). OS should provide advice very soon on SIM. What the project comes back with may not be adequate. If SIM is terminated without a viable back-up plan, the funds will disappear.
5) *Boilerplate contract language.* The particular issue was onerous and costly computer security requirements. More generally, there was concern that boilerplate language appears in contracts before the community has an opportunity to comment or provide feedback. The SScAC felt that there should be a process for putting the language out to the community to allow for comments before it is implemented. Dr. Weiler suggested that the SScAC invite the top-level staff person (the CIO) at NASA Headquarters to the SScAC meeting to discuss the specific issue. He also suggested that the SScAC draft a letter to Gen. Armstrong regarding the problem as it relates to NASA/university relations.
6) *ACCESS.* The restructuring of ISS (on which SScAC is not fully informed) could potentially have a negative impact on ACCESS. The SScAC has concerns that the restructuring could make ACCESS more expensive, less effective, or impossible. What is the best course of action for SScAC? Dr. Weiler suggesting that the SScAC wait until the budget comes out and see what all the elements and the impacts are. Dr. Squyres noted that in an environment in which ISS costs are growing, it is important to protect the science budget against encroachment. Dr. Weiler indicated that he has the full assurance of the Administrator that OSS funds will not be diverted to Space Station. Dr. Weiler indicated that funding for ACCESS is a priority decision that Dr. Bunner must make. There are no funds for Cosmic Journeys. Dr. Weiler suggested that ACCESS could be proposed under the Mid-class Explorer (MIDEX) AO that is going out this June. If there is language that precludes ACCESS from being proposed, this should be raised and discussed at a Science Directors' meeting.

Solar Probe Science

Dr. Bruce Tsurutani of JPL discussed Solar Probe science. The science objectives are to determine the acceleration processes and find the source regions of fast and slow solar wind at maximum and minimum solar activity, locate the source and trace the flow of energy that heats the corona, construct the 3D coronal density configuration from pole to pole, and identify the acceleration mechanisms and locate the source regions of energetic particles. Dr. Tsurutani discussed why the solar wind is important to SEC—it creates all the dynamics of what we see in the magnetosphere. He showed examples of transformer damage as a result of magnetic storms. During solar maximum, large coronal mass ejections (CME's) occur about once a month. Dr. Tsurutani described shock propagation and triggering of auroras. What is learned from SEC could be applied for finding magnetized planets elsewhere. Solar Probe has two integrated instruments—in-situ and remote sensing. The in situ sensors are also integrated in terms of simultaneous data-taking at rapid rates. There will be good diagnostics on shocks. The remote sensing suite will make a 3D map of the corona. Solar Probe will fly by Jupiter to get an assist for a perihelion trajectory to the Sun. The mission starts at about 0.5 AU (-10 days) and ends on the other side (+10 days). Perihelion will be 4 solar radii. Dr. Tsurutani noted that he could come back in six months and present a more detailed briefing on the engineering aspects. Solar Probe will provide the first maps of the polar magnetic fields. The Solar Probe magnetograms will be the highest resolution magnetograms of the photosphere ever obtained. Dr. Squyres observed that this will be the most challenging environment that a spacecraft has ever been sent into. Dr. Tsurutani noted that the biggest uncertainty is the dust environment and the impact of the dust on the spacecraft. A workshop has been organized to look at this issue this summer. In addition, there will be high velocity tests at the Naval Research Laboratory (NRL). This is the only lien on the design. The radiation environment is relatively benign. There is a white paper on the impact of a solar flare on the spacecraft; it would produce Earth radiation belt levels, not Jupiter radiation belt levels. The actual duration in the environment is only a couple thousand seconds. Solar Probe will be the first encounter with

a star (our Sun) and will obtain the fist accurate measurements of the Sun's polar magnetic fields. It will provide the highest spatial resolution measurements of the photosphere and corona, trace mass and energy flow of plasma, determine the generation mechanism of interplanetary Alfven waves, definitively identify the processes that lead to the acceleration of the fast and slow solar wind, and produce the first 3D image of the solar corona. In addition, there are space weather issues. Solar Probe will provide the first direct "ground truth" observations of the near-Sun plasma environment that governs all space weather phenomena and will provide direct measurements of the source region of the high and low speed solar wind. The AO was issued in September 1999; instrument selection was scheduled for March 2001 (before the Budget Blueprint cancellation) with launch in February 2007.

Sounding Rockets and Balloons

Dr. Vernon Jones discussed the sounding rockets and balloons program. He stated that both of these programs are "sick" and the only "antibiotic" is money. Both programs came in for overguides last year and will be back for substantial overguides this year. Both have operation floors, below which they are not viable. Both are now at or below those floors. There is only one balloon supplier, and NASA's order rate cannot sustain that supplier. Substantial funds were removed from the program during the streamlining exercise of the Zero Base Reviews. There have been no inflationary increases for about 5 years. The carryover reserves were removed from sounding rockets to start the University Explorer (UNEX) program. Restoration of those funds solve about 50% of the problem. The carryover reserves in balloons was used for Ultra-Long Duration Balloons (ULDB). ULDB is still not developed, although tests are positive. Cancellation of UNEX may preclude ULDB missions. (UNEX was never able to develop the needed $1 M launch capability.) Last year, the missions were prioritized under two options, but there were not enough funds to do all of the missions. There was a campaign of 13 missions, and additional funds were provided to bring the campaign to a total of 19 missions. The science themes are selecting payloads, but the program doesn't have enough funds to provide the rockets and operations. Dr. Jones described the "average" rocket (Black Brant). Although there is more money this year, the missions still have to be prioritized. The option is to do the missions deferred from the previous year (the Poker Flat campaign) plus additional missions for a total of 24. The discipline scientists reach consensus on what flies (all of the science is already peer-reviewed). The geospace discipline has taken the brunt of the postponement. Sounding rockets need an additional $2 M to do the rest of the payloads that are ready in 2002. In out-years, motors and support systems will need to be procured and over $5 M will be needed each year to maintain the target flight rate of 20 missions per year. There have been issues with the NASA Sounding Rocket Operations Contract (NSROC), but not all of the problems come from NSROC. There were some failures at White Sands, and NSROC has implemented corrective actions. A separate review team is looking at the NSROC contract.

With respect to balloons, a very successful Antarctic Balloon Campaign was completed. It achieved a record flight duration of 26 days. Data tapes and flight support equipment were recovered. Most of the experiment hardware was left on the ice until next season. Dr. Jones showed the trajectory of the mission. There are about the same number of balloon flights as sounding rocket flights. Until the last few years, there were no changes in balloon design. Dr. Jones showed the new balloon design—a ULDB pumpkin balloon. Four have been flown with some success (e.g., a 33 hour flight). Technology development is continuing. One of the issues with ULDB is population density (potential casualty rate) and trajectory control. The program needs a capability that will stabilize the trajectory at end of mission. There was an External Independent Readiness Review of the ULDB program and the team was impressed by the balloon team. It recognized that all parts of the balloon operations are under stress, driven particularly by inadequate funds. Extended duration missions are more complex and result in increased remote campaign activity for longer period of time. The balloon program needs about $ 5M per year for operations; additional funds are needed to maintain ULDB capability and conduct one ULDB flight per year. In response to a question, Mr. Jones noted that payloads have already been selected for the flight rate represented by the total budget needs. Dr. McComas noted that in the rocket program, there is an infrastructure baseline that must be supported, regardless of how many rockets are flown. Dr. Jones added that the same is true of the balloon program. Some of the SScAC members were concerned about the apparent imbalance between the funding for the payloads and the funding for the rockets (more payloads are being selected than can be flown). The geospace sciences dominate the candidates for the FY 2001 rocket program. Astrophysics dominates the FY 2001 balloon program.

Committee Discussion

Reorganization of advisory structure—Dr. Margon stated that there are hybrid plans that could address the concern raised by Dr. Weiler. For example there could be two separate subcommittees that would meet in parallel (separately at the same location at the same time, with plenary sessions on the third day of the meetings). Trying to have people in common on both subcommittees would be a burden on those members. Dr. Squyres noted that in practice, the subcommittees advise OSS Directors, but provide reports to the SScAC. Some members felt that in the long run, it might be advantageous to realign the subcommittees with the Division Directors. Other members were concerned about the loss or compromise of the theme structure, which has provided a very effective focus for science, and felt that the subcommittees should remain separate even in the long term. The SScAC agreed that the suggestion by Dr. Margon would be a good short-term (e.g., one-year) plan; it would be too great a shock to merge the subcommittees at this time.

ACCESS and ISS—Dr. Margon suggested that the SScAC recommend that the MIDEX AO (to be released in June) be amended to make it possible to propose attached station payloads. Right now there are three impediments under the AO as currently written: no attached station payloads unless they are Missions of Opportunity; Missions of Opportunity are capped at $30M; and payload must be 60 months to orbit. The suggestion would be to remove the first statement and add that the last statement does not apply to Station payloads. The SScAC adopted this recommendation. Dr. Bunner observed that there are some pros and cons to the ACCESS mission in following this approach—it has already been through peer review on the Strategic Plan; however, if there are impediments to that route, the mission must look for another viable path.

NGST—The program has taken steps to address the issues. There has been a significant reduction of cost, but most of the science was preserved. There are international complexities that cannot be avoided. The project has proposed the optimum credible program, given the political and financial constraints. Overall, the SScAC was impressed with the actions taken by the project and commended it on the results of the restructuring. Dr. Margon noted that the SWG was very pleased with the descope plans; its biggest concern was the complexities in the instrument sharing arrangements. However, it had no better suggestions. The SScAC endorsed the OS finding regarding the international arrangements and the mid-IR instrument.

Solar Probe—There has been a clear indication that Solar Probe has been terminated by the Administration. The SScAC was very impressed by the scientific merits of the mission. It has been highly ranked and is well positioned in the Strategic Plan. The project has done a great job of bringing costs down. The perception that this program is experiencing cost growth needs to be corrected. The SScAC could not comment on the budget aspects (it did not have budget information), but recognized the scientific importance of Solar Probe.

FY 2002 Performance Targets

Ms. Jennifer Kearns discussed the FY 1999 Plan and the FY 2000 Plan. The FY 1999 Plan had only 27 targets; OSS met 23 of them. When audited by GAO and the IG, they stated that it was not comprehensive enough. Therefore, in construction of the FY 2000 Plan, a target was selected for each line in the budget (65). All of the progress in R&A and Data Analysis (DA) accounted for only 2 targets. OSS did very well on these; however, only 34 targets were accomplished out of the total of 65. The balance of science and programmatics was skewed in the wrong direction. There was a problem with weightings as well as the way that some of the mission targets were written. OSS took issue with the way that the colors were assigned by the Comptroller and wants to adjust the FY 2002 plan to eliminate these types of problems. The FY 2002 targets are those that OSS really cares about, and they tie closely with the Strategic Plan. They also respond to the entirety of the OSS budget (but not line by line). A suggestion was made to structure the plan along the lines of the budget, but have the criteria be science-based rather than programmatic. This would be difficult; a lot of the lines are mission hardware based, and it would be hard to phrase these in terms of science for a particular FY. It was generally agreed that OSS went farther than it needed to go in response to criticism on the FY 1999 plan. The FY 2002 plan should be structured so that someone doesn't come along and collapse the first 8 things (science) to 2 and expand the last 4 things to 60. The SScAC felt that what was presented for FY 2002 was appropriately structured—there are 8

goals attributed to science; this reflects the right balance. There should be flexibility in the indicators. The objectives and annual performance goals come almost directly from the Strategic Plan, and this is as it should be. The SScAC suggested deleting the words "earn external review rating of 'green' or 'blue'" from each of the Annual Performance Goals, and add at the end of each "as determined by external review." The relative weighting of the indicators should be in within the judgment of the external reviewers. Dr. Squyres suggested that the indicators for the programmatic items (embargoed and not shown to the SScAC at this meeting) should be written very carefully—don't write ones that are ambiguous. Dr. Margon suggested adding "peer-reviewed" to the fourth indicator under EPO, if, in fact, these projects are peer reviewed. The skeleton of the FY 2003 plan will be presented to the NAC in June. OSS would like to get SScAC's endorsement of that structure. It will follow the same structure in FY 2002. The SScAC endorsed the overall structure.

Technology Program Status

Dr. Harley Thronson reported on the status of the technology program. He discussed the duties and responsibilities of the Technology Director, the working group and task group, technology and mission acquisition evaluations, propulsion and IT/Information System (IS) priorities, and the OSS Technology "strategic plan." The Director works with two groups—a working group (the Space Science Technology Management Operations Working Group) and a task group (the Technology Steering Group). The SScAC may want to call on these groups from time to time. The task group will be working on an OSS Mission Technology Inventory for the technology strategic plan. It will be a searchable data base that lists technology investments, the applicable mission(s), the TRL level, the funding profile, etc. Two experts in experimental economics/game theory are modeling the relationships among Headquarters and the Centers/JPL. The results will be presented over the summer. A Senior SAIC technologist with relevant experience has been contracted to carry out an in-depth evaluation of technology acquisition strategies in a variety of somewhat comparable agencies and academia. MSFC is leading a 6-month systems analysis of representative future mission concepts for in-space propulsion. Ultimately, there will be a propulsion "roadmap" for OSS and the Agency. An Agency-wide evaluation on IT/IS will begin soon. OSS will start with the determination of IT/IS requirements for future missions (software and hardware). Dr. Thronson asked the Committee: Are there other major capabilities for which a broad 'relevance and needs' analysis should be undertaken? GSFC (Mary Kicza) has been instructed to do an analysis of large optical systems of interest to OSS and the Office of Earth Science. Another possibility might be robotics and autonomous systems. A key aspect of the analysis is a system study (injecting new technology). The SScAC felt that robotics and remote autonomous systems and large optical systems are applicable across a wide range of disciplines. These are the right things on which to have a relevance and needs analysis performed. Dr. Thronson noted that three studies should be done or nearly complete by the next meeting: in-space propulsion, robotics and remote autonomous systems, and large optical systems. OSS does not currently have a formal "strategic plan" for technology beyond the general guidance in the Space Science Strategic Plan. The technology strategic plan would address the policies and principles to acquire and support technology, the balance of long- and short-term funding, maturation and deployment of technology, determination of OSS needs (long and short-term), partnerships with other agencies, the current technology portfolio (including gaps), and risk management. A nearly complete, advance version of an OSS technology strategic plan could be ready by the end of the summer, sufficient to begin input into the OSS Strategic Plan. It would have to be vetted by the SScAC. Dr. Squyres noted a couple of potential pitfalls. He advised Dr. Thronson to be careful with the label 'strategic plan'; it would be best to get away from that term. If it is going to be strategic in nature, the activity must be synchronized with the next version of the OSS Strategic Plan. In addition, Dr. Thronson's activity also needs to be involved in the roadmap activities of the themes. Technology priorities need to be driven by the themes. Dr. Thronson noted that he would be working with the subcommittees and Dr. Allen on this task, and he requested that the SScAC take a critical look at the product.

Committee Discussion

Before adjourning for the day, the SScAC returned to the issue of balloons and sounding rockets. Dr. McComas noted that this issue was presented in the SECAS report. The SECAS feels that the program is badly broken, and something needs to be done. This program is critically important to SEC disciplines (e.g., geospace science). The SECAS made the recommendation that OSS strive for 30 flights per year, based upon science needs. Dr. Margon indicated that SEU (Dr. Bunner) has not asked for more funds for

sounding rockets. Dr. Papike agreed there is an issue, but more information is needed. Dr. Squyres noted that the rocket and balloon programs serve very important needs. They provide a near-space environment for certain payloads, and they provide the capability to train young scientists on payload hardware. Dr. Mellott noted that part of the problem is that the theme directors lost contact with the operations part of the budget. As a result of a previous SScAC recommendation, Dr. Withbroe was given responsibility for the rocket program. Dr. Margon felt that the SScAC needs to hear a more global view of the severity of the problem, e.g., what stress the Board of Directors feels from the situation on the rocket and balloons programs. The SScAC agreed that the science that is done in the rocket and balloon program is a good investment of dollars; balloons and rockets have significant merit in filling an important niche; they serve both scientific and education needs. Given the new management structure in OSS, there is a natural way to deal with the rockets and balloons programs, e.g., put balloons under Astronomy and Physics and put the rockets under SEC. They should be integrated into the programs of these two Divisions.

SScAC requested the new OSS organization chart, with staff names, after it is formally announced.

Thursday, March 22

Committee Discussion

The SScAC discussed another subject raised the previous day—the Mars Scout missions. In the current program, the Scouts are intended to be Discovery-like missions with a cap around $300M. These would be complete missions, proposed by the community. The scientific intention would be to fill in scientific gaps in the Mars Program. There are two questions: (1) what is the best way to get this started? and (2) Is the Program heading too far in the direction of a single large mission instead of more smaller missions? The AO process allows for a wide range of possible approaches. Dr. Drake noted that the approach to start with a workshop, select a number of studies for development, put out the AO, select more than one concept, and then downselect for flight would lead to a rather restricted Phase C/D period. The SSES discussed this issue and suggested that Mr. Hubbard work to maximize the Phase C/D period. The SSES also discussed the issue of scope—what can be proposed under Scout? The SSES urged Mr. Hubbard to define the program broadly. While the focus for the 2007 mission is a surface mission, the 2011 mission could include "drop off" payloads with an orbiter. This is the era of sample return; there could also be some type of surface package. The key is defining the program broadly. Dr. Papike felt that Scouts should bring in new expertise (encourage new and different players). Dr. Drake agreed that the net should be cast widely with respect to targets, types of spacecraft, and community.

Discussion with the CIO on IT Security

Mr. Lee Holcomb, NASA CIO, met with the SScAC to discuss the issue of the "boilerplate" clause on computer security. Dr. McComas noted that there were two concerns: fingerprinting graduate students and the need for a comment period. The Federal Register notice mechanism is in place, but has proven to not be very efficient. Mr. Holcomb noted that the clause was routed through every Office at Headquarters for concurrence before it was sent to the Centers for implementation. He did acknowledge that there were substantive problems with interpretation of the clause by GSFC. The procurement clause derives from two policies, one of which is the IT security policy (under the control of Mr. Holcomb) and the NASA security policy (under the control of the new Code X). When those two came together, the Procurement Implementation Clause (PIC) has some ambiguities in it. Contracting Officers (CO's) were instructed internally to follow a general principle: bring the Center IT Security Manager, the Project Manager, and the CO together to negotiate applicability. The general guidance was to negotiate, not to issue unilaterally. This clause does not apply to grants at all. NASA is primarily concerned with mission critical systems, and this was in the guidance to the negotiating officers. It is not applicable to research, nor is it applicable to processing space data at levels beyond level 0/1. Headquarters has contacted GSFC several times and told them to fix the problem (there is not a problem with other Centers). Mr. Holcomb stated that he intends to suspend negotiating this clause into the disputed contracts. There are areas where it should have some applicability, e.g., operating spacecraft equipment from an institution (but only for people who have privileged access to the computers). The area where it is cloudy is developing flight software associated with an instrument—Headquarters has left this up to the Center Project Managers. For certain instruments it might be appropriate to apply it. The SScAC felt that the specific instances of where it is applicable

need to be written into the language or given to universities. Gen. Armstrong and Mr. Holcomb have been working to communicate this issue to the universities, i.e., to clarify procedures and to communicate it to CO's. Dr. Margon noted that the remedy should also address those contracts that have already been modified (costs are being expended to track employee terminations, etc.). Mr. Holcomb agreed that this should be considered if there are large costs involved to implement this clause. He suggested that the SScAC be given what Gen. Armstrong has produced to put into the SScAC summary that goes to the community. Dr. Squyres also asked Mr. Holcomb to provide a statement on what he had communicated to the committee today. Mr. Holcomb noted that the policy was put in the Federal Register for comment (from around December 1999 to around June 2000). The SScAC was concerned about developing a better process for getting the word to the community. Dr. Squyres noted that OSS could be of some help—when the PICs are circulated internally, someone in OSS could flag those that could be problematic and communicate those to the community. Mr. Holcomb stated that a decision has been made to suspend any further action on implementing the clause. The direction to GSFC will go out this week. IT security is a serious issue. Mr. Holcomb noted that he is working with the science community to implement security measures in a cost-effective manner. Dr. Squyres agreed that the science community realizes that lack of security can be extremely damaging and researchers take it very seriously.

Discussion of Recommendations

The SScAC developed recommendations on the following topics: attached ISS payloads as MIDEX projects; the reorganization of the advisory structure; Solar Probe; sounding rocket and balloon operations; NGST; computer security; and the Mars Program.

Final recommendations are in the letter from Dr. Squyres to Dr. Weiler (included in Appendix D).

Strategic Planning 2003

Dr. Allen presented the preliminary thinking for the 2003 Strategic Plan. The general approach will be similar to the 1997 and 2000 plans. There will be one new aspect: input from two surveys by the NRC on SSE and SEC, similar to the astronomy Decadal Survey. These studies will emphasize community outreach and prioritization and will focus on science, with less emphasis on missions. They will produce a broadly based, compelling science story. These studies will not be done until the beginning of next calendar year, which means that the roadmapping activity will fall into two phases. The first phase will start this fall (without the NRC input) and will include the collection of mission candidates and characterization as well as technical and cost estimation. In April/May 2002, the subcommittees will start the second phase (taking into account the NRC science survey results and formulating theme mission queue recommendations) and finish it in October 2002. The Technology Plan will also enter during Phase 2.

The Strawman schedule is: initiate roadmap activities—fall 2001; NRC science survey results available—April/May 2002; initiate roadmap phase 2 activities—May 2002; roadmapping results due to Headquarters—September/October 2002; consensus workshop—November 2002; first plan draft circulated for review (SScAC and Space Studies Board)—February 2003; SSB comments on draft—May 2003; Final SScAC review—July 2003; plan goes into production—August 2003; plan released—September 2003.

Dr. Squyres observed that the roadmapping and strategic plan activities should draw as much as possible on the good work that has already been done. This message needs to come very strongly from OSS (Dr. Allen).

Before adjourning, Dr. Squyres briefed Dr. Weiler on the key issues that were discussed by the SScAC:

1) Boilerplate contract language – The SScAC had a very positive interaction with NASA's CIO, Mr. Holcomb. He indicated that for the particular issue (a computer security clause being implemented by GSFC), he is declaring a moratorium until the Agency can review the situation and resolve the problems. There was a specific suggestion that someone in OSS keep an eye on PICs, and alert the community (universities) when they might have a potential impact.
2) NGST – The SScAC was very pleased with the reformulation; it was exemplary. There were a few concerns about the complexities of the payload arrangements and the mid-IR instrument that were highlighted by the OS.

3) Solar Probe – The SScAC was very impressed by the quality of science and how important it is as a key component of the Strategic Plan; it reiterated strong support for the mission.
4) Suborbital Program – The SScAC has always been a strong supporter of the suborbital program; it fills a unique niche. There seems to be a mismatch between the amount of selected science and what can be launched. It would be a good thing to address the problems through the reorganization.
5) ISS Attached Payloads – The SScAC recommends that the MIDEX AO be revised to allow ISS attached payloads within the full MIDEX cost cap. Although some aspects might be "untidy," the science would be worth it.
6) Mars Program – The SScAC was impressed with the robustness of the Mars Program. At the last meeting, the Committee enthusiastically endorsed Mars "Discovery-like" missions. When the AO for this is released, the "net" should be cast widely enough so that innovative concepts (from the large to the very small) can compete on their science merits. The SScAC believes that a strong R&A element should be part of any robust program, and it endorsed a Mars R&A program.
7) Subcommittee Restructuring – The SScAC concluded that the best way to handle this is to maintain separate committees for the present, but closely coordinate the activities (e.g., committees meet at the same location on the same dates, with a plenary session at the end). For the longer term, the SScAC will reevaluate this arrangement in about a year.

Dr. Weiler encouraged everyone to fully understand the OSS budget (when it is released with the NASA budget on April 9) before drawing any conclusions. It will take some studying to understand all of the "puts and takes." He noted that overall, this Administration has been very fair to OSS. Because they are starting three months late, it will be a challenge for the Congress to pass a budget bill by October 1, 2001.

AGENDA

Space Science Advisory Committee

NASA Headquarters, Rm 5H46
March 20-22, 2001

Tuesday, March 20

8:30	Welcome and Chair's Remarks	Squyres
8:45	Science Theme Director Reports	
	- Sun-Earth Connection	Withbroe
	- Structure and Evolution of the Universe	Bunner
	- Astronomical Search for Origins	Kinney
9:45	*Break*	
10:00	Mars Exploration Program	Hubbard
10:30	Proposed EPO Task Force	Rosendhal
11:00	OSS Status Report and Discussion	Weiler
Noon	*Lunch Talk on the NEAR Mission: Science Results and Touchdown*	Cheng & Farquhar
1:00	Science Theme Director Report	
	- Solar System Exploration	Bergstralh
1:20	Outer Planets	Hartman
1:45	Subcommittee Reports	
	- Solar System Exploration	Drake
	- Structure and Evolution of the Universe	Margon
	- Astronomical Search for Origins	Dressler
	- Sun-Earth Connection	McComas
3:15	*Break*	
3:30	Research Program Status	Riegler
4:30	Discussion	Squyres
5:30	*Adjourn*	
7:00	*Committee Dinner at Barolo Ristorante*	

Wednesday, March 21

8:30	Chairman's Remarks and Discussion	Squyres
9:00	NGST Reformulation	Kinney
10:00	Report to Associate Administrator	Weiler
11:15	Solar Probe Science	Tsurutani
Noon	*Lunch*	
1:00	Sounding Rockets and Balloons	Jones
2:00	Discussion	
2:45	*Break*	
3:00	2002 Performance Plan	Kearns
4:00	Technology Program Status	Thronson
5:00	Discussion	
5:30	*Adjourn*	

Thursday, March 22

8:45	Strategic Planning 2003	Allen
9:00	Discussion with CIO	
9:30	Discussion and Letter Writing	Squyres
Noon	*Adjourn*	

SPACE SCIENCE ADVISORY COMMITTEE
Membership List

Dr. Steven W. Squyres (Chair)
Cornell University

Dr. David L. Akin
University of Maryland

Dr. Charles A. Beichman
Jet Propulsion Laboratory

Dr. Alok Das
AFRL/VSC

Dr. Michael J. Drake
Lunar and Planetary Laboratory
University of Arizona

Dr. Alan M. Dressler
Carnegie Observatories
Carnegie Institute of Washington

Dr. Jack D. Farmer
Department of Geology
Arizona State University

Dr. Wendy L. Freedman
Carnegie Observatories
Carnegie Institute of Washington

Dr. David H. Hathaway
Marshall Space Flight Center

Dr. Isabel Hawkins
University of California, Berkeley

Dr. Edward W. Kolb
Fermi National Accelerator Laboratory

Dr. Molley K. Macauley
Resources for the Future

Dr. Bruce H. Margon
University of Washington

Professor Richard A. Mewaldt
Space Radiation Laboratory
California Institute of Technology

Dr. David McComas
Southwest Research Institute

Dr. James J. Papike
Institute of Meteoritics
University of New Mexico

Dr. Douglas O. Richstone
University of Michigan

Dr. William Smith
Association of Universities for Research in Astronomy

Dr. Maria T. Zuber
Massachusetts Institute of Technology

Dr. Marc S. Allen ***(Executive Secretary)***
NASA Headquarters, Code S

SPACE SCIENCE ADVISORY COMMITTEE (SScAC)
NASA Headquarters
March 20-22, 2001

MEETING ATTENDEES

Committee Members:

Squyres, Steven *(Chair)*	Cornell University
Allen, Marc *(Executive Secretary)*	NASA Headquarters
Beichman, Charles	NASA/JPL
Das, Alok	AFRL/VSC
Drake, Michael	University of Arizona
Dressler, Alan	Carnegie Observatories
Hathaway, David	NASA/MSFC
Margon, Bruce	University of Washington
McComas, David	Southwest Research Institute
Mewaldt, Richard	California Institute of Technology
Papike, James	University of New Mexico
Richstone, Douglas	University of Michigan
Smith, William	AURA

NASA Attendees:

Bergstralh, Jay	NASA Headquarters
Bohan, Alberto	NASA/JPL
Calabrese, Michael	NASA/GSFC
Frederick, Suzanne	NASA/JPL
Hasan, Hashima	NASA Headquarters
Horowitz, Steve	NASA Headquarters
Hubbard, Scott	NASA Headquarters
Kinney, Anne	NASA Headquarters
Kniffen, Donald	NASA Headquarters
LaPiana, Lia	NASA Headquarters
Lehman, Dave	NASA/JPL
Mather, John	NASA/GSFC
Morrison, David	NASA/ARC
Mucklow, Glenn	NASA Headquarters
Norris, Marian	NASA Headquarters
Randolph, Jim	NASA/JPL
Rosendhal, Jeffrey	NASA Headquarters
Sorrel, Carrie	NASA Headquarters
Thronson, Harley	NASA Headquarters
Tsurutani, Bruce	NASA/JPL
Vondrak, Richard	NASA/GSFC
White, Nick	NASA Headquarters
Withbroe, George	NASA Headquarters
Woods, Dan	NASA Headquarters

Other Attendees:

Andreoli, Leo	TRW
Appleby, John	APL
Beres, Kathleen	TRW

Burrowbridge, Don	Windermere
Cheng, Andrew	APL
Davidson, Greg	TRW
Decker, Bill	Brasher LP
DiBiasi, Lamont	L. DiBiasi Associates
Helon, George	Caltech
Herman, Dan	[consultant]
Hopkins, Joanne	SRI International
Malay, Jon	Ball
Nordwind, Frederic	ESA
Richardson, Carry	Boeing
Richardson, Larry	Boeing
Sarzo, Michael	Warren Communications
Talent, David	Lockheed Martin

SPACE SCIENCE ADVISORY COMMITTEE (SScAC)
NASA Headquarters
March 20-22, 2001

RECOMMENDATIONS

Cornell University
Center for Radiophysics and Space Research

April 25, 2001

Dr. Ed Weiler
Associate Administrator for Space Science
NASA Headquarters
Washington, DC 20546

Dear Ed:

The Space Science Advisory Committee (SScAC) met at NASA Headquarters on March 20-22, 2001. Our findings and recommendations from this meeting are summarized below:

Solar Probe

We heard a presentation on the scientific content of the Solar Probe mission from the Solar Probe Project Scientist, Bruce Tsurutani. ***We remain very excited about the scientific goals of this mission.*** The interlinked problems of coronal heating and solar wind acceleration remain as two of the key unsolved problems in solar and heliospheric physics. Solar Probe would make in situ measurements of the plasma environment from a vantage point a mere two million kilometers above the surface of the Sun, well within the region where the solar wind is being accelerated. The close passages of Solar Probe over the Sun's poles would provide us with detailed views of the polar regions. The results from this mission will have important consequences for our understanding of the Sun's magnetic dynamo and its 11-year activity cycle.

We are pleased to note that this science can be accomplished within the cost guidelines that were established for the Solar Probe mission several years ago. ***This mission has long occupied a key position in roadmaps for the scientific goals of the Sun-Earth Connection Theme, and it now occupies a similar position within the Living With a Star Program. It has our strongest support.***

Next Generation Space Telescope (NGST)

We were briefed by John Mather on the status of the Next Generation Space Telescope project, and we also heard a report from our Origins Subcommittee on this project. We were informed that the NGST project has just gone through a major restructuring in order to stay within budget guidelines. A thorough replanning process led to several major changes to the NGST program. The primary ones are (a) a somewhat smaller telescope (with a 6 to 7 meter aperture), (b) a warmer operating temperature (of about 50K), (c) fewer pixels in the near IR instrument, and (d) no NEXUS mission.

It is our judgment that ***these changes address the technical and cost challenges that were facing NGST while preserving the core science of the project. We strongly commend the NGST project for this rescoping effort.*** We also commend them for their interactions with the science community as the rescoping occurred, and we encourage continued interaction as further choices are made in the years to come. We concur with our Origins Subcommittee that even with the changes NGST remains an immensely powerful scientific facility. We also concur with the OS on two issues dealing with the importance of the Mid-IR waveband and the complex international relationships involved in the NGST instrument development plan. We refer you to the most recent OS letter to Anne Kinney for a fuller discussion of these topics.

Reorganization of the Code S Advisory Structure

The reorganization of Code S that you described to us raises the issue of how SScAC should provide scientific advice to the new Director of Astronomy and Physics. After considerable thought and discussion, ***we recommend that the current structure of separate OS and SEUS committees be maintained, both reporting to the new Director.*** We advocate this structure because we feel at this time that one reasonably-sized committee cannot cover the full range of current Origins and SEU science, even with Astrobiology being moved to a different Division. We believe that the two committees should henceforth coordinate the times and locations of their meetings so that routine combined plenary meetings are possible. ***This arrangement should be considered provisional, and should be reevaluated by SScAC in approximately one year's time.***

Sounding Rockets and Balloons

We heard a report on the status of the Sounding Rocket and Balloon programs. ***Both programs appear to be struggling to provide enough flight opportunities per year*** to meet the demand of peer-reviewed and selected payloads and thereby maintain a healthy program. We recognize the essential role that these two sub-orbital programs play in training graduate students, developing new instrumentation in support of the Code S flight programs, and in carrying out unique, low-cost, high-quality scientific investigations. We note that the SEC Theme is the largest user of sounding rockets, while the SEU Theme provides most of the balloon payloads. Given the on-going reorganization of Code S ***it is therefore appropriate that these two programs be managed separately within the Sun-Earth Connection and Astronomy and Physics Divisions, respectively***, so that available resources can be used to optimize the scientific productivity of these programs.

Attached ISS Payloads as MIDEX Projects

We had a discussion of attached payloads on the International Space Station. The Code S Strategic Plan, and independently the NAS Decadal Survey, have identified high priority scientific investigations that are well-matched to, and most cost-effective as, ISS attached payloads. There may be cases where such investigations can fit within the MIDEX cost cap, but almost certainly not within the MIDEX time duration cap. ***We urge Code S to revise the MIDEX AO to permit attached ISS payloads to compete for MIDEX selection, up to the full MIDEX cost cap (not merely as a Mission of Opportunity), effective with the next AO release.***

Mars Exploration

We received a report from Scott Hubbard and Jim Garvin on the state of the Mars Exploration Program. The program appears to be in good shape. We note that the President's budget blueprint expressed support for a "robust" Mars Program. This position, if adopted by Congress, indicates the Mars Program may be able to proceed at a more rapid pace than we heard about at our last meeting.

Most of our discussion focused on the "Mars Scout" program. We recommend careful definition of the scope of this program, with particular effort made to "cast the net widely" in the search for innovative, PI-led mission concepts. We have the following specific recommendations:

The Scout program should specifically permit all missions to Mars space that fit within the cost caps and schedule constraints of the Program. In addition to orbital and landed missions to Mars, missions should be permitted that focus primarily on the martian moons Phobos and Deimos, the upper atmosphere, and "network science". Any of these would complement the missions that are part of the main Mars Program.

The Scout program should explicitly allow for a broad range in the size and number of spacecraft proposed. Maintaining this flexibility will help maximize the creativity that proposers can bring to bear. The program should also enable the possibility that more than one PI might propose a component of a given Scout opportunity.

The Scout program should seek investigators from as wide a community as possible, possibly by including Guest Investigator opportunities.

We note the concern expressed by the SSES over the tight development schedule for the 2007 Scout mission, and we concur with the SSES recommendation to maximize development time for the selected mission.

Finally, we note that a "robust" Mars program implies the need for additional R&A funds. We also note that there are significant funds provided within the program for development of future missions. ***It would be wise for NASA to use a small percentage of***

these funds (1-2%) to fund a Mars R&A program competed using peer-review through the release of a NRA.

Computer Security

During the course of our discussions, we learned that NASA has notified contractors dealing with certain categories of space science data that an extensive set of security measures must be implemented in order to satisfy OMB Circular A-130. These include the requirement to obtain fingerprints for personnel having access to such data and a requirement to notify NASA when any transfer of data takes place, including data in the public domain. While we clearly recognize the need to provide a high level of protection for publicly funded data and computer systems, these measures would be burdensome and difficult for many contractors, particularly at universities, to implement. In addition, they could be very costly to NASA.

When this subject arose, we invited Lee Holcomb, NASA's Chief Information Officer, to meet with us. We were very pleased to have him join us, and even more pleased to receive the following statement from him:

"The IT Security Clause was suspended to universities for 90 Days and the suspension expires on June 23, 2001. Suspension was NASA-wide for uniformity and equity. The IT Security Clause was suspended because of inadequate guidance with regard to applicability of the clause to university contracts, i.e., when the clause applies and when it does not. Applicability criteria need to be clarified and spelled out. In addition, the use of the clause with respect to the extent of personnel screening and IT security training required needs to be clarified. During the suspension period NASA plans to develop adequate guidance and if necessary, amend the language in the IT Security Clause. Specifically NASA plans to work with the Centers and universities in developing adequate guidance and if necessary, amend the wording of the clause. A web-cast to all universities will be conducted in late June to communicate the clarifications and changes."

This action is directly responsive to our concern, and we commend the Agency for it. We look forward to hearing more about the resolution of this issue at our next meeting.

In addition to the specific problem discussed above, we are concerned about the general issue of the adverse effects of some Procurement Implementation Clauses (PICs) on the scientific community. ***We recommend that someone in Code S be specifically assigned the responsibility to review draft PICs and notify the community when PICs of potential concern are opened for comment in the Federal Register.***

Education and Public Outreach Task Force

We heard a presentation from Jeff Rosendhal urging that a new SScAC Task Force for Education and Public Outreach be formed. The purpose of this task force would be to provide a thorough review of Code S's Education and Public Outreach program.

Unfortunately, Jeff was unable to be present for our whole meeting, and we felt that we could best reach a consensus on this topic if he were with us. Accordingly, we tabled it until our next meeting.

That summarizes the results of our meeting. Please don't hesitate to contact me if you would like any clarification or further detail on any of the points that we've raised above.

Best wishes,

Steve Squyres
Chair, SScAC

cc: SScAC
M. Allen
J. Alexander
L. Holcomb
S. Hubbard
J. Garvin
J. Rosendhal
B. Tsurutani
V. Jones
J. Mather

SPACE SCIENCE ADVISORY COMMITTEE (SScAC)
NASA Headquarters
March 20-22, 2001

LIST OF PRESENTATION MATERIAL[1]

1) Presentation to SScAC – Sun-Earth Connection [Withbroe]
2) Mars Exploration Program [Hubbard]
3) A Proposal to Establish an SScAC Education and Public Outreach Task Force [Rosendhal]
4) Space Science Enterprise [Weiler]
5) Solar System Exploration [Bergstralh]
6) Presentation to the SScAC – Outer Planets Directorate [Hartman]
7) Structure and Evolution of the Universe Subcommittee – Report to the SScAC [Margon]
8) SECAS Report [McComas]
9) Next Generation Space Telescope [Mather]
10) Solar Probe Science [Tsurutani]
11) Sounding Rockets and Balloons [Jones]
12) Space Science Enterprise FY02 Performance Plan [Kearns]
13) OSS Technology Director Report [Thronson]
14) Provisional SP 2003 Approach [Allen]

Other material distributed at the meeting:

1) *Aviation Week*, December 11, 2000
2) Letter from D. McComas to G. Withbroe, March 8, 2001, re SECAS Meeting, 20-22 February 2001 at NASA Headquarters
3) Letter from A. Dressler to A. Kinney, March 15, 2001, re OS Meeting, March 6, 2001
4) State of the Origins Program
5) Space Science Advisory Committee Report, November 1-2, 2000

[1] Presentation and other material distributed at the meeting are on file at NASA Headquarters, Code S, Washington, DC 20546.